



# ICEL S.R.L. – PRODUCTS AND APPLICATIONS



# PROFESSIONAL FILM CAPACITORS FOR POWER APPLICATIONS

- **Polypropylene** and **polyester** dielectric
- **Axial** and **box** types
- **Pin**, **lug** and **wire** executions



# CAPACITORS FOR INDUSTRIAL ELECTRONICS

**We supply standard and custom solutions for**

- Motor Control
- Induction heating
- Inverters
- Medical
- Converters
- Traction
- Welding
- Power Supplies
- UPS



**High performance and reliability**

# CAPACITORS FOR POWER APPLICATIONS

**We supply standard and custom solutions for**

- DC-link
- Snubber/Clamper
- Filtering
- Switching
- Pulse
- Motor run



**High performance and reliability**

# POWER CAPACITOR MAIN APPLICATIONS

Application	ICEL Series
DC-link	MHBS, DCB
Output harmonics filtering	PHB, MHBA, MHBS, PHS
Snubber for IGBT protection - lug type	PMS, PMB / RMB
Snubber for IGBT protection - pin type	PPR, PPB, PHS, PSB / RSB

# DC-LINK

To support the DC net by supplying periodical high currents by discharging the capacitor to smoothen the waveform

- **DCB** – medium-high frequencies, medium-high current, only for DC operation
- **MHBS** – medium-high frequency, high current, suitable also for AC applications, high performance/size ratio, high energy density



# DC-LINK

**DC-link capacitor is providing low impedance path for ripple current. Low inductance to gain high efficiency / low losses**

- **Benefits of film capacitor in DC-link applications**
  - **High voltage and current ratings**
  - **Low ESR, low self inductance and low dissipation factor**
  - **Tight C tolerance**
  - **low drift of parameters, good long term stability**
  - **High insulation resistance, low leakage current**
  - **Long expected life, high reliability, wide temperature range**
  - **Increased safety by self healing**

# AC FILTERING – SWITCHING

To reduce distortion of the harmonic components on the fundamental frequency

- **MHBA** - Input/output AC and DC filtering, switching. High frequency, high current
- **PHB/PMC** - filter, switching, clamping, high current, high frequency



# AC FILTERING

## Input AC filtering

- surge or high pulse stresses, voltage fluctuations and other line disturbances are typical for this application
- Specific attention must be paid for the choice of capacitors to be used
  - the choice of the **right capacitor** is fundamental to avoid critical operating conditions and consequent possible failures
- ICEL S.r.l. technical support is always available!

# SNUBBER / CLAMPER

To protect circuit components by damping dangerous voltage spikes

**LUGS execution:** Direct installation on IGBT terminals or busbar. Different lug versions available

- **PMS** - medium pulse, high current, low Esr
- **PMB/RMB** - high pulse, high current, low Esr

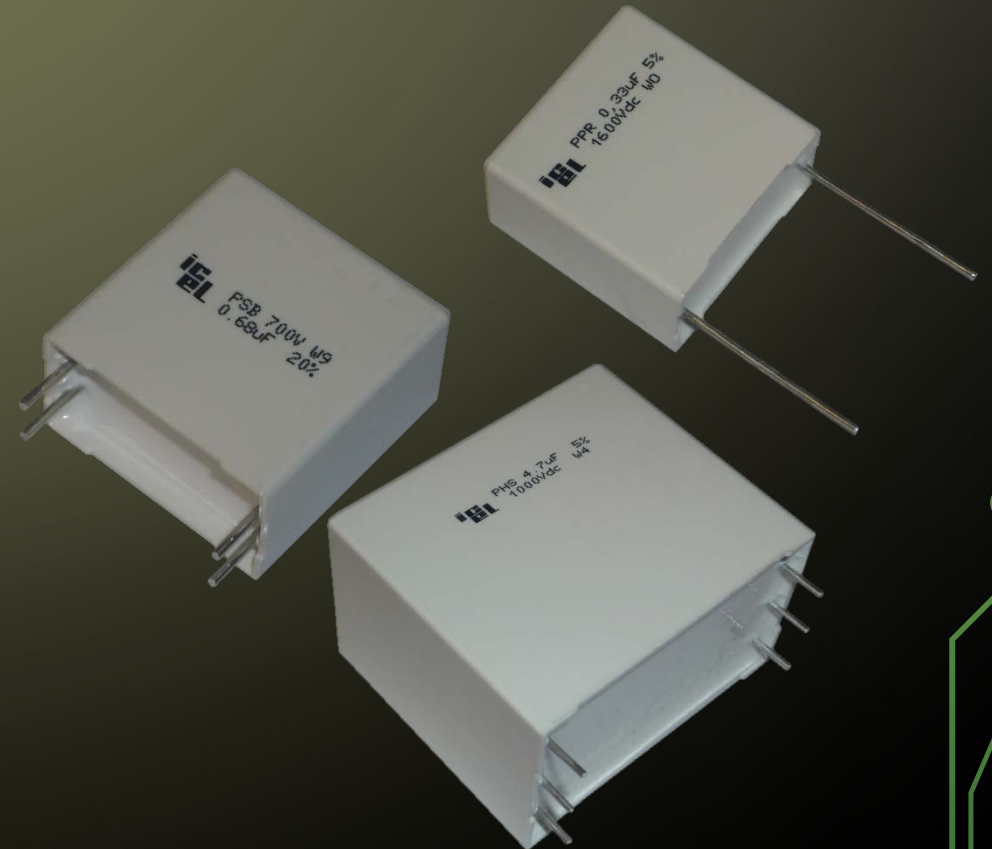


# SNUBBER / PULSE

To protect circuit components by damping dangerous voltage spikes

## PINS execution

- **PPR/PPB** - high performance, high pulse, high frequency
- **PHS** - medium-high pulse, high current
- **PSB/RSB** - high pulse, high current



# SNUBBER

**Capacitors should be placed close to switch to keep circuit inductances low. Lug terminals allow mounting directly on IGBT modules**

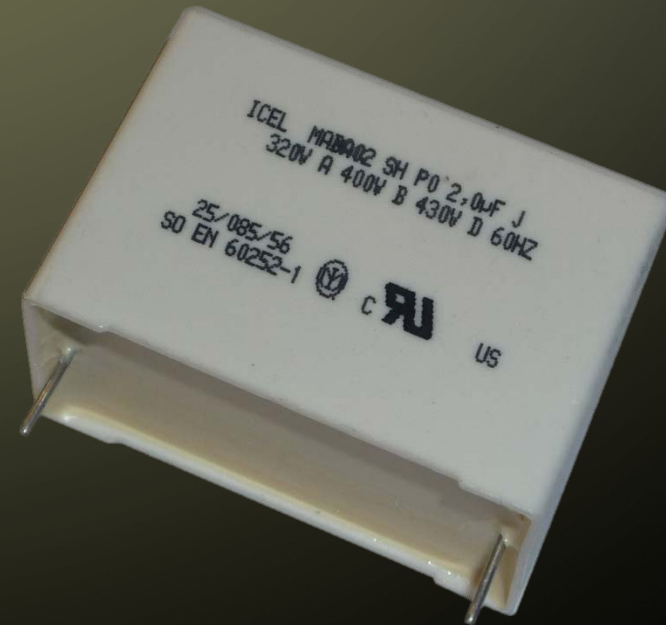
- **Specs to be considered for snubbers**

- **low self inductance and low ESR**
- **$dV/dt$**
- **Peak current ,  $I_{rms}$**
- **Power dissipation capability**
- **High reliability, long life**
- **Frequency characteristics**

# MOTOR RUN

**MABA01 and MABA02 series EN60252-1 approved  
UL - CSA (construction only) approvals upon request**

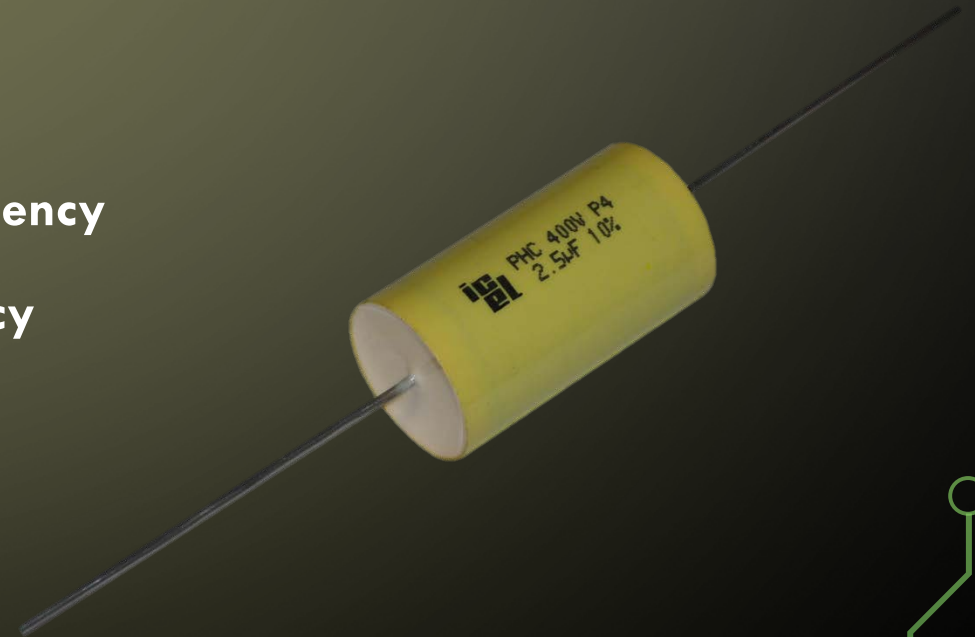
- **MAB** - AC motor run and also low power switching applications



# AXIAL CAPACITORS

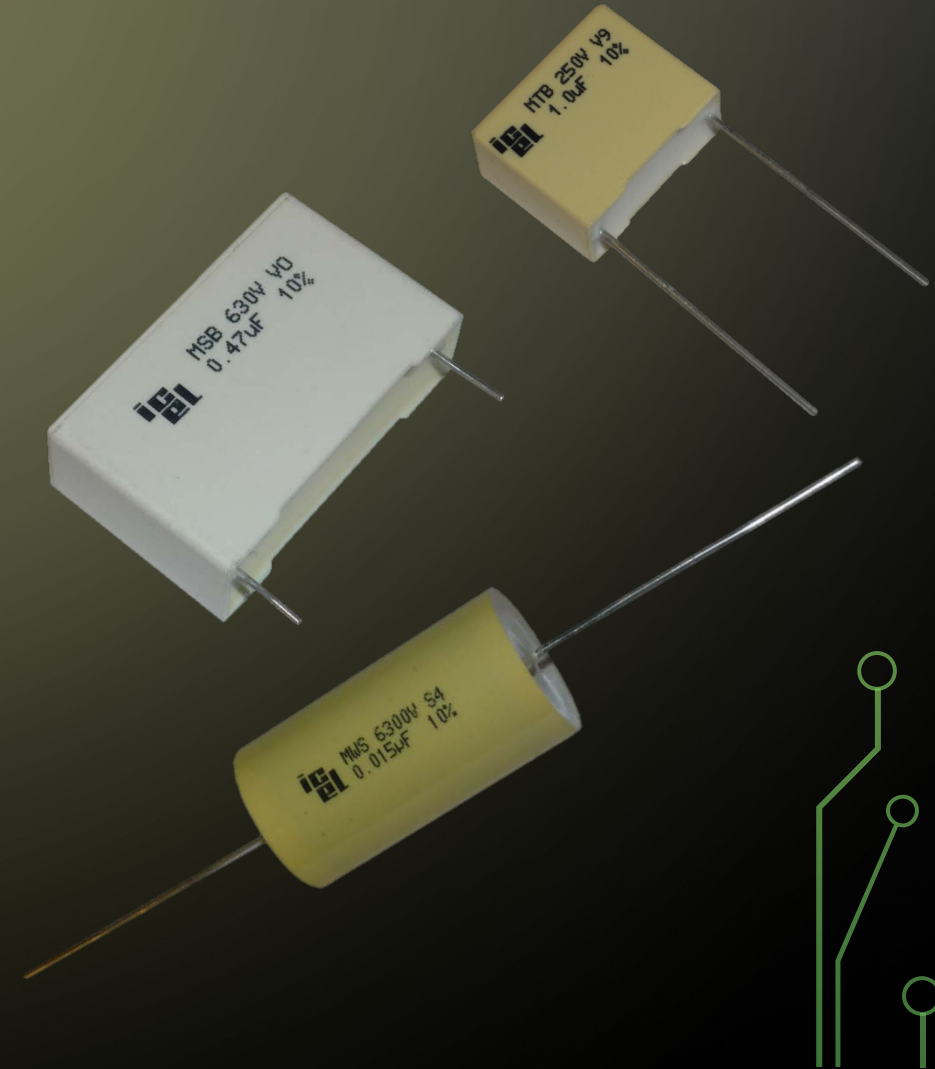
## Switching and pulse

- **PHC** - switching, high current, high frequency
- **PPS** - switching & pulse, high voltage, current & frequency
- **PPA** - pulse/snubber, high voltage, current & frequency
- **PWS** - film foil snubber, very high pulse, low losses



# POLYESTER CAPACITORS

- **MTB** - general purpose, very low AC voltage motor running
- **MSB** - general purpose, high performance, very low AC voltage motor running
- **MWS** - high voltage up to 10kVdc



# FUTURE DEVELOPMENTS

**ICEL R&D is actively developing new products to follow the market needs and requirements**

- **Harsh environment applications (humidity, temperature)**
- **High current/resonant applications**

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The image features a dark, gradient background with stylized circuit board patterns in the corners. These patterns consist of thin, light green lines forming various geometric shapes, including rectangles and circles, which resemble electronic components or traces on a PCB. The patterns are located in the top-left, top-right, bottom-left, and bottom-right corners, framing the central text.

# BACKUP

Application / Series	PW PWS	MPB	PPR PPB	MPH	DCB	PHC	PHB	PMC	MHBA	MHBS	PPS	PHS	PMS	PPA	PSB RSB	PMB RMB	MAB	PHP**
Blocking		X	X^	X	X²	X²	X²	X²	X²	X²	X°	X°	X°	X^	X^	X^	O	X²
Coupling/ decoupling (low pulse)		X	X^	X	X²	X²	X²	X²	X²	X²	X°	X°	X°	X^	X^	X^	O	X²
Bypassing		X	X^	X	X²	X²	X²	X²	X²	X²	X°	X°	X°	X^	X^	X^	O	X²
Filter/ Frequency discrimination	O	X		O	X²	X²	X²		X²	X²	X°	X°					O	X²
Timing, oscillation / high stability	X	X																
Motor running									O	O	O	O		O	O		X	
AC operation (general purpose)			O						X	X	X	X		O	O		X	X
High frequency ripple filtering			O	X	X	X	X	X	X	X	X	X	X	O	O	O	O	X
High Irms current operation	O		O	X	X	X	X	X	X	X	X	X	X	X	X	X	O	X
High frequency operation	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	O	X
High pulse / Pulse coupling	X		X								O	O	O	X	X	X		X²
Snubber for semiconductors	O		X								O	O	O	X	X	X		X²
Clamper for IGBT and MOSFET			O	X	O	X	X	X	X	X	X	X	X	X	X	X	O	X
DC-Link				O	X	O	O	O	X	X							O	O
Low dissipation/ high therm. effc.	X		X								O	O	O	X	X	X		O
Resonant / Induction heating	O		O	O			O	O	O	O	O	X	X	X	X	X		X
AC/DC motor controls					X	X	X	X	X	X	X	X	X	X	X	X	O	X
Battery chargers						X	X		X	X							X	X
Welding Inverter	O		X^		Y		Y	Y	Y	Y				X^	X^	X^		O
Inverters/ Converters/ UPS					X	X	X	X	X	X	X	X	X	X	X	X	O	X
Railway traction/ Electric vehicles							X	X	X	X		X	X		X	X		X
Elevators					X		X	X	X	X		X	X		X	X	O	X
Solar and wind converter					X		X	X		X		X	X				X	X

X = recommended/ designed for (X²= high frequency; X°= high frequency and medium-high pulse; X^= high frequency and high pulse)  
O = possible choice / second choice

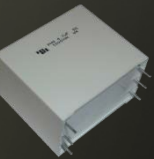
# DC-LINK

SERIES	STYLE	Cr (uF)	Vdc	Vac	V/us	application
DCB	radial	7.5 - 125	450 - 1100		7.0 - 20	DC-link, medium high freq, medium high current
MHBA	radial/lug	1.0 - 75	370 - 800	160 - 400	25 - 120	high freq. / high current, DC / AC applications
MHBS	radial/lug	0.68 - 100	575 - 1275	240 - 440	12.5 - 61	med. high freq / high current, DC / AC applications



# AC FILTERING – SWITCHING

SERIES	STYLE	Cr (uF)	Vdc	Vac	V/us	application
PHB	radial	0.1 - 75	250 - 850	160 - 500	15 - 375	high freq., high current
PHS	radial	0.0068 - 18.5	550 - 3000	340 - 750	72 - 1500	medium high pulse, high current
MHBA	radial/lug	1.0 - 75	370 - 800	160 - 400	25 - 120	high freq., high current DC / AC applications
MHBS	radial/lug	0.68 - 100	575 - 1275	240 - 440	12.5 - 61	medium freq., high current, DC / AC applications
PHP	radial/lug	0.022 - 30.0	875 - 3250	450 - 825	195 - 2700	high pulse, high current, AC applications
PMC	lug	1.2 - 75	250 - 700	160 - 400	15 - 70	high freq., high current
PMS	lug	0.0068 - 18.5	550 - 3000	340 - 750	72 - 750	medium high pulse, high current
MPH	axial	1.0 - 30.0	100 - 400	60 - 200	20-Oct	high freq., high current
MPL	axial	0.001 - 4.7	160 - 630	90 - 250	12,5 - 200	precision capacitor DC applications
MAR	axial	0.22 - 60	370 - 800	160 - 500	15 - 120	AC applications, medium high current
PHC	axial	0.1 - 60.0	250 - 850	160 - 500	15 - 375	high freq., high current
PPS	axial	0.0068 - 10	700 - 3000	420 - 750	90 - 1500	switching, medium high pulse, high current



# SNUBBER / PULSE

SERIES	STYLE	Cr (uF)	Vdc	Vac	V/us	application
PPR	radial	0.0022 - 15	250 - 2000	175 - 700	105 - 7000	high pulse, high frequency
PPB	radial	0.001 - 6.8	250 - 2000	160 - 700	170 - 9000	high pulse, high frequency high performance
PHS	radial	0.0068 - 18.5	550 - 3000	340 - 750	72 - 1500	medium high pulse high current
PSB/RSB	radial	0.0047 - 12.0	700 - 3000	420 - 750	285 - 6300	high pulse, high current
PHP	radial/lug	0.022 - 30.0	875 - 3250	450 - 825	195 - 2700	high pulse, high current AC applications
PMS	lug	0.0068 - 18.5	550 - 3000	340 - 750	72 - 750	medium high pulse high current
PMB/RMB	lug	0.047 - 12.0	700 - 3000	420 - 750	285 - 2500	high pulse, high current
PWS	axial	0.001 - 0.56	630 - 2000	300 - 500	1800 - 27k	high pulse, high frequency
PPS	axial	0.0068 - 10	700 - 3000	420 - 750	90 - 1500	medium high pulse, high current
PPA	axial	0.0047 - 6.8	700 - 3000	420 - 750	300 - 5250	high pulse, high current
PW	axial	0.0001 - 0.022	160 - 400	90 - 160	2200 - 13k	high stability, high pulse, high freq.



# POLYESTER CAPACITORS

SERIES	STYLE	Cr (uF)	Vdc	Vac	V/us	application
MTB	radial	0.001 - 150	63 - 1000	40 - 400	0,8 - 80	general purpose, DC application
MSB	radial	0.001 - 82	50 - 1000	40 - 400	4 - 80	DC application, high performance
MSR	radial	0.01 - 22	63 - 1500	40 - 300	4 - 80	general purpose, DC application
MTR	axial	0.001 - 150	63 - 1000	420 - 750	1 - 120	general purpose, DC application
MWR/MWF	axial	0.001 - 100	50 - 1500	450 - 825	4 - 90	general purpose, DC application
MWS	axial	0.0015 - 0.68	2500 - 10k	500 - 1600	70 - 1200	high voltage, DC application

